

BASHULIN, P. A.

USSR/Physics - Raman Spectra

Sep/Oct 52

"Improved Procedure for Molecular Analysis on the Basis of Raman Spectra," P. A. Bashulin and G. V. Peregudov, Phys Inst in Leningrad, Acad Sci USSR --

Is Ak Nauk, Ser Fiz, Vol 17, No 5, pp 617-620

Describe photographic method of molecular analysis, based on simultaneous photography of the standard and the tested sample. Method has advantages over those previously described (Izv Ak Ser Fiz 4, [1940] 5, [1941] 7) in eliminating errors due to unsteady light of mercury lamps. Indebted to G. S. Landsberg.

27493

BAZHULIN, P. A.

USSR/Physics - Raman Spectra

Sep/Oct 53

"Chart of Raman Spectra of Individual Hydrocarbons,"
G. S. Landsberg, P. A. Bazhulin and M. M. Sushchinskii,
Phys Inst im Lebedev, Acad Sci USSR

Iz Ak Nauk, Ser Fiz, Vol 17, No 5, pp 604-607

Informed the Conference on Spectroscopy (Moscow,
2-10 July 1952) that a chart of Raman spectra of
individual hydrocarbons is under preparation, awaiting
criticism and eventual modifications. The chart contains
the following groups of hydrocarbons: paraffins,
including all isomers, naphthenes, aromatic

274T91

hydrocarbons and some olefins. The work was completed
with assistance of Inst of Org Chem, Acad Sci
USSR headed by B. A. Kazanskiy.

BAZHULIN, P. A.

USSR.

545.82 : 535.375.5

10622. Improved method of molecular analysis by Raman spectra. P. A. BAZHULIN AND G. V. PEREGUDOV. *Izv. Akad. Nauk SSSR, Ser. Fiz.*, 17, No. 5, 617-20 (1973) In Russian.

The solution under investigation, and a reference solution, are placed in two separate cells disposed parallel to one another and symmetrically with respect to two mercury u.v. lamps, illuminating the cells from both sides. The light scattered from both cells is collected by means of a rotating prism and lens system, and produces on the spectrographic film two images near to one another, of the Raman spectra of the two liquids. The method saves about 6-8 hours in making a complete analysis of a mixture of organic substances.

R. C. MUKRAY

BAZHULIN, P. A.

USSR/Physics - Optical Methods, Chem- 1 Feb 53
istry

"Optical Method of Investigation of Organic Silicon Derivatives of Hydrocarbons," Yu. P. Yegorov and P. A. Bazhulin, Phys Inst imeni Lebedev, Acad Sci USSR

DAN SSSR, Vol 88, No 4, pp 647-650

Investigates unsatd org si compds of the alkeno-silane type containing groups with double bonds $\text{CH} = \text{CH}_2$, $\text{CH}_2\text{CH} = \text{CH}_2$, as well as radicals CH_3 , C_2H_5 at si. Analyzes intensity of characteristic freqs giving information on structure of mols. Presented by Acad G. S. Landsberg 3 Dec 52

249T53

BASHULIN, P. A.

USSR/Physics - Raman Effect
Silicon Organic Compds

21 Sep 53

"Optical Method of Investigation of Organic Silicon Compounds," P.A. Bashulin, Yu. P. Yegorov and Y.F. Mironov

DAN SSSR, Vol 92, No 3, PP 515-517

Continue previous work (DAN 88, 4 (1950)) by studying additivity of intensities of characteristic frequencies in spectra of combination scattering [Raman effect] of allyl silanes. Tabulate constants of synthesized silanes. Presented by Acad G.S. Landsberg 22 Jul 53.

268890

KAZANSKIY, B.A.; LANDSBERG, G.S.; PLATE, A.F.; LIBERMAN, A.L.; MIKHAYLO-
VA, Ye.A.; BAZHULIN, P.A.; BATUYEV, M.I.; UKHOLIN, S.A.; BULANOVA, T.F.;
TARASOVA, G.A.

Composite method for the determination of individual hydrocar-
bons in gasolines. Part 3. The Surakhany gasolines. Izv.AN SSSR,
Otd.khim.nauk no.2:278-291 Mr-Ap '54. (MLRA 7:6)

1. Institut organicheskoy khimii im. N.D.Zelinskogo, Fizicheskii
institut im. P.N.Lebedeva Akademii nauk SSSR.
(Hydrocarbons) (Surakhany--Petroleum) (Petroleum--Surakhany)

USSR.

✓ Determination of individual hydrocarbons in gasoline by the combined method. V. Gasoline from Emba crude oil. R. A. Karanskii, G. S. Landsberg, A. P. Plate, P. A. Kazantsev, A. L. Liberman, E. A. Mikhailova, M. M. Samokhin, G. A. Tarasova, S. A. Ukhodim, and S. V. Voronko (S. D. Zhukovskii Inst. Org. Chem., Acad. Sci. U.S.S.R., Moscow). *Izv. Akad. Nauk S.S.S.R., Otdel. Khim. Nauk* 1954, 865-77; cf. *C.A.* 48, 14170b. —Analysis of a gasoline from Emba crude oil by a combination of distillation, chromatography, and dehydrogenation-hydrogenation reactions resulted in establishing the structure of 81.1% of the hydrocarbons present. The gasoline is of naphthenic type, and the paraffins are predominantly branched. The following isomers were identified: 2,2-dimethylbutane, 2,3-dimethylbutane, 2-methylpentane, 3-methylpentane, hexane, methylcyclopentane, 2,2-dimethylpentane, 2,3-dimethylpentane, cyclohexane, 2,3-dimethylpentane, 1,1-dimethylcyclopentane, 2,3-dimethylpentane, *cis*- and *trans*-1,3-dimethylcyclopentanes, *trans*-1,2-dimethylcyclopentane, methyl- and ethylcyclohexanes, 1,2,4-trimethylcyclopentane, 2,4- and 2,4-dimethylhexanes, 1,2,3-trimethylcyclopentane, 2,4-dimethylhexane, 1,2,3-trimethylcyclopentane, 3- and 4-methylheptane, 1,1-dimethylcyclopentane, 1,1,3-trimethylcyclohexane, 3- and 4-methyloctanes. Ethyl and *o*-, *m*-, and *p*-xylenes were also identified; *m*-xylene being the predominant aromatic hydrocarbon. G. M. Kosolapoff.

USSR/ Chemistry Fuels

Card : 1/1

Authors : Kazanskiy, B.A., Landsberg, G.S., Plate, A.F., Bazhulin, P.A., Liberman, A.L., Suschinskiy, N.M., Tarasova, G.A., Ukholin, S.A., Voronko, S.V.

Title : Combined method for the determination of the individual hydrocarbon composition of gasolines. Part 4.- Gasoline from the Tuymazinsk petroleum.

Periodical : Izv. AN SSSR, Otd. Khim. Nauk., 3, 456 - 469, May - June 1954

Abstract : The results obtained from the study of the individual hydrocarbon composition of gasoline with end point of 150°, derived from low-sulfur Tuymazinsk petroleum (Devonian horizon), are described. The quantitative, individual hydrocarbon composition of Tuymazinsk gasoline and the general losses are presented in percentage by weight values. The structure of paraffin-base gasoline derived from Tuymazinsk petroleum and the aromatic contents of other hydrocarbons are discussed. Toluene and m-xylene were found to be predominant among aromatic hydrocarbons. Four USSR references. Tables, graphs.

Institution : Acad. of Sc. USSR, The P. N. Lebedev Physics Institute

Submitted : July 20, 1953

BAZULIN, P. A.

USSR/ Chemistry Spectral analysis

Card : 1/1 Pub. 40 - 20/27

Authors : Bazulin, P. A., Koperina, A. V., Liberman, A. L., Ovodova, V. A., and
Kasansky, B. A.

Title : Optical method of studying hydrocarbons. Part 7.- Combined diffusion
spectra of certain naphthenes

Periodical : Izv. AN SSSR. Otd. khim. nauk 4, 709 - 715, July - August 1951

Abstract : Combined diffusion spectra of seven cyclopentane and cyclohexane hydro-
carbons, were investigated and the intensities of the spectral lines in
the maximum state were determined photometrically. The spatial
orientation of side chains in naphthenes and stereoisomers, was
determined on the basis of spectroscopic data. Tables, showing the
frequency and intensity of spectral lines of the investigated
naphthenes, are included. Ten references: 8 USSR and 2 USA (1941 -
1951). Tables; diagrams.

Institution : Acad. of Sc. USSR, The N. D. Zelinskiy Institute of Organic Chemistry

Submitted : August 30, 1953

BAZHULIN, P. A.

USSR/ Physics - Spectral analysis

Card 1/1 Pub. 43 - 19/62

Authors : Bazhulin, P. A.; Rautian, S. G.; Sokolovskaya, A. I.; Sushchinskiy, M. M.

Title : ~~Methods of studying the widths of combined light diffusion lines~~
Methods of studying the widths of combined light diffusion lines

Periodical : Izv. AN SSSR. Ser. fiz. 18/6, 678-679, Nov-Dec 1954

Abstract : The results obtained during the study of various methods for measuring the width and contour of combined light diffusion lines are briefly outlined. The possible distortion factors which may effect the width and form of the lines are listed. It is shown that the distorting effect of each of the factors depends not only upon the width but also the form of the test mechanism functions as well as the form of the diffusion lines investigated. Three USSR references (1941-1953). Table.

Institution : Acad. of Sc., USSR, The P. N. Lebedev Phys. Inst.

Submitted :

BAZHULIN
USSR/Physics - Raman spectra

FD-3253

Card 1/1 Pub. 146 - 12/44

Author : Bazhulin, P. A.; Rautian, S. G.; Sokolovskaya, A. I.; Sushchinskiy, M. M.

Title : Methods for the investigation of the width of lines of combination scattering of light and their application

Periodical : Zhur. eksp. i teor. fiz., 29, No 6(12), Dec 1955, 822-829

Abstract : A consideration of the influence of various factors upon the observed width of combination-scattering lines, and a description of methods for the exclusion of these factors' influence upon the results of measurements. The authors present the results of measurements of the width of a number of combination-scattering lines in a prismoid spectrograph with large dispersion. They compare the obtained data with data found by other methods. The authors thank Academician G. S. Landsberg for his advice and Kh. Ye. Sterin, V. T. Aleksanyan for the preparation of the data. Seventeen references: e.g. Kh. Ye. Sterin, Dissertation, Physical Institute im. P. N. Lebedev, Acad. Sci. USSR, 1949.

Institution : Physical Institute imeni P. N. Lebedev, Academy of Sciences USSR

Submitted : July 15, 1954

BAZHULIN, P. A.

✓ The relation of width of the combination line and the state of aggregation of substances. P. A. Bazhulin and A. V. Bakker. *Doklady Akad. Nauk SSSR* 197, 66-67 (1966). — The widening of the combination dispersion lines was studied as a function of the rotational mol. motion during the liquid-solid conversion of benzene at 18° in the liquid phase, and at -5° in the solid, and of p-dichlorobenzene at 65° and at 20°. Conversion of the liquid to the crystal state widened the lines considerably. The total widening is affected by depolarization. The line width is reduced to 0.2 to 0.33 of its value when depolarization has progressed to about 6/7 during the liquid → crystal state, but the width of the polarized lines ($\rho \ll 1$) changes only to 0.4 to 0.6 at the same conditions. W. M. Sternberg

chem

2

428

DM

BAZHULIN

B-4

USSR / Physical Chemistry. Molecule. Chemical Bond.

Abs Jour : Ref Zhur - Khimiya, No 8, 1957, 25830K

Author : G.S. Landsberg, P.A. Bazhulin, M.M. Sushinskiy.

Inst : Academy of Sciences of USSR,

Title : Basic Parameters of Combination Scattering Spectra of Hydrocarbons.

Orig Pub : AN SSSR, 1956, 342 str., ill., 22 r. o5 k.

Abstract : No abstract.

Card : 1/1

- 37 -

Bazhulin, P. A.

Methods of investigation of the line width of Raman
lines and their application. P. A. Bazhulin, S. G. Rautian,
A. I. Sokolovskaya, and M. K. Shchegolev. Soviet
Phys. JETP 2, 553-561 (1956) (Engl. transl.)
- C.A. 50, 3404c.

Phys 4

BAZHULIN, P. A.

Category: USSR / Physical Chemistry - Molecule. Chemical bond.

B-4

Abs Jour: Referat Zhur-Khimiya, No 9, 1957, 29601

Author : Markova S. V., Bazhulin P. A., Sushchinskiy M.M.

Inst : not given

Title : Optical Method of Investigation of Hydrocarbons. Raman Spectra of Unsaturated Hydrocarbons.

Orig Pub: Optika i spektroskopiya, 1956, 1, No 1, 41-53

Abstract: To determine the characteristic frequencies of oscillations an investigation was made of Raman spectra and a determination of the differential (I_0) and integral (I_∞) intensity of 16 unsaturated hydrocarbons: cyclopentene (I), 1-n-propyl cyclohexene-1, 2-methyl butene-1, 4-methyl-4-ethyl hexene-1, 6-methyl heptene-1, 3-cyclopentyl butene-1, 4-cyclopentyl butene-2, 3-ethyl pentene-2, 3-methyl pentene-2, nonene-4, diallyl, dipropenyl (IV) and 1,3-cyclohexadiene (V). It was found that for substances containing the C=C group in alpha position the line ν 1642 cm^{-1} is characteristic, both in intensity at the Maximum $I_0 = 125$, and the integral intensity $I_\infty = 400$; half-width of line (δ),

Card : 1/3

-17-

Category: USSR / Physical Chemistry - Molecule. Chemical bond.

B-4

Abs Jour: Referat Zhur-Khimiya, No 9, 1957, 29601.

calculated by the method of Sushchinskiy, is 6.3 cm^{-1} , and the degree of depolarization of line $\rho = 0.1-0.2$. For the branched alpha-olefins of characteristic nature are only the frequencies of all lines of the group $\text{CH} = \text{CH} -$. For olefins having the double bond inside the chain and a branching far removed therefrom, there is observed the line 1673 cm^{-1} for the trans-form, and line 1658 cm^{-1} for the cis-form. If the double bond is at the middle of the chain, then the group $\text{C}=\text{C}-$ is characterized by line 1676 cm^{-1} , and I_∞ is about 40% higher than in the case of alpha-olefins and, consequently, the characteristic nature of the intensity of these lines is retained only in the case of similar compounds. For cyclo-olefins there is observed a change of $\text{C}=\text{C}$ frequency from 1614 cm^{-1} , if the methyl group is not adjoining the double bond of I and III, to 1659 cm^{-1} in the case of II, wherein the CH_3 is at the double bond. I_0 , I_∞ and ρ for cyclo-olefins are constant ($\rho = 3.0-3.8 \text{ cm}^{-1}$), and the intensity of fully symmetrical oscillations $\nu 898 \text{ cm}^{-1}$ of the five-membered ring undergoes little change, even in comparison with cyclo-paraffins, although the half-

Card : 2/3

-18-

USSR/Physical Chemistry - Molecule. Chemical Bond.

B-4

Abs Jour : Referat Zhur - Khimiya, No 6, 25 March 1957, 18175
 Author : Rezacv, N.I., Bazhulin, P.A.
 Title : Measurement of Contours and Widths of Lines of Raman Spectra by the Method of Photoelectrical Registration
 Orig Pub : Optika i spektroskopiya, 1956, 1, No 5, 715-718

Abstract : The form and the width of certain lines of Raman spectra of benzol (I), toluol (II), ethylbenzol (III), n-butylbenzol (IV) and n-hexylbenzol (V) were examined by the photoelectrical method. The contours of all lines which have been measured and contour of the exciting line approached to dispersion contour, and therefore the determination of the width of lines of Raman spectra was carried out by deducting the width of the exciting line from the width of the observed contour of a line. The following values of frequencies (cm^{-1}) and widths (in brackets)

Card 1/2

- 30 -

USSR/Physical Chemistry - Molecule. Chemical Bond.

Abs Jour : Referat Zhur - Khimiya, No 6, 25 March 1957, 18175

were found:

I 606(7.3); 992(1.9); 1586(12.0); 1606(11.0).
 II 786(2.3); 1004(1.8); 1031(2.1); 1585(9.6); 1605(8.6).
 III 1005(1.9); 1032(3.5); 1583(11.0); 1606(8.5).
 IV 1003(3.6); 1033(4.5); 1585(7.6); 1606(7.7).
 V 1003(2.6); 1031(3.8); 1584(6.8); 1606(7.9).

Card 2/2

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[illegible]

BAZHULIN, P.A.

PRIKHOT'KO, A.F.

24(7)

p3

PHASE I BOOK EXPLOITATION 30V/1365

L'vov. Universitet

Materialy I Vsesoyuznogo soveshchaniya po spektroskopii. t. 1: Molekulyarnaya spektroskopiya (Papers of the 10th All-Union Conference on Spectroscopy. Vol. 1: Molecular Spectroscopy) [L'vov] Izd-vo L'vovskogo univ-ta, 1957. 499 p. 4,000 copies printed. (Series: Its: Fizicheskyy sbirnyk, vyp. 3/8/)

Additional Sponsoring Agency: Akademiya nauk SSSR. Komissiya po spektroskopii. Ed.: Gaser, S.L.; Tech. Ed.: Saranyuk, T.V.; Editorial Board: Landberg, G.S., Academician (Resp. Ed., Deceased), Reporent, B.S., Doctor of Physical and Mathematical Sciences, Fabelinskiy, I.L., Doctor of Physical and Mathematical Sciences, Kharikova, V.A., Doctor of Physical and Mathematical Sciences, Koritskiy, V.G., Candidate of Technical Sciences, Rayakiy, S.M., Candidate of Physical and Mathematical Sciences, Klimovskiy, L.K., Candidate of Physical and Mathematical Sciences, Miliyanchuk, V.S., A. Ye., Candidate of Physical and Mathematical Sciences.

Card 1/30

- Pominov, I.S. Study of Ion Solvation in Alcohol-
-aqueous Solutions by Means of Absorption Spectra 213
- Shorygin, P.P., and L.L. Krushinskiy. Dependence of
the Intensity of Raman Lines on the Excitation-light
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Intensity of Raman Lines on the Exciting-light Fre-
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Interaction and Intensities in Raman Spectra 223
- Sokolovskaya, A.I., and P.A. Bzhulig. Effect of
Temperature on Raman Spectra in Liquids 225
- Mikhaylov, G.V. Effect of Temperatures on the Raman
Spectrum of Isopentane 227

Card 15/30

512 H444 H A

62-1-5/21

AUTHORS: Peregudov, G. V.; Markova, S. V.; Bazhulin, P. A.; Plate, A. F.; Terentyeva, Ye. M.

TITLE: Optical Method of Studying Hydrocarbons. Part 10. Combined Diffusion Spectra of Certain Naphthenes (Opticheskiy Metod issledovaniya uglevodorodov. Soobshcheniye 10. Spektry kombinatsionnogo rasseyaniya nekotorykh naftenov)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Khimicheskikh Nauk, 1957, No. 1, pp. 37-42 (U.S.S.R.)

ABSTRACT: In this report, the results (combined diffusion spectra) obtained during the study of nine naphthenic and one aromatic hydrocarbons (three mono-cyclic cyclopentane; three dicyclic cyclohexane and four bicyclic hydrocarbons with condensed rings) are presented. All data on the intensities and frequencies of the hydrocarbons were determined photometrically. For each hydrocarbon, a brief description of its derivation and the basic constants such as boiling point, specific weight, index of refraction is given. The intensity data are expressed in a

Card 1/3

Optical Method of Studying Hydrocarbons. Part 10. Combined 62-1-5/21
Diffusion Spectra of Certain Naphthenes

ASSOCIATION: Academy of Sciences of the USSR, Physics Institute imeni P. N.
Lebedev and Institute of Organic Chemistry imeni N. D. Zelinskiy

PRESENTED BY:

SUBMITTED: December 13, 1955

AVAILABLE: Library of Congress

Card 3/3

**Application of Combination Light Scattering to the Investigation
of the Composition and Structure of Substance**

53-2-4/9

cesses occurring on the occasion of the interaction of a light wave with a molecule, have an influence on the spectra of combination scattering.

Spectra of combination scattering of the complicated polyatomic molecules having several characteristic structure elements, in many cases are produced by an additive superposition of the spectra of the separate structure elements. This is discussed more exactly at the example of different groups of paraffins. The study of the rotation isomerism of paraffins proves to be very interesting. Experimental examination of the oscillation spectra permits the determination of the totality of the oscillation frequencies, from which the force constants of the molecule under investigation can be computed.

The molecular analysis by means of the application of the spectra of combination scattering of light: This analysis is based on the fact, that the spectrum of the combination scattering is an individual optical characteristic of the molecule. The development of this combination scattering is especially important for organic chemistry. There are 1 figures, 4 tables and 56 references, 48 of which are Slavic.

Card 2/3

BAZHULIN, P. A.
BAZHULIN, P. A. (Acad. Sci. USSR)

"Investigation of Temperature-Dependence of Infrared Absorptions Band Intensity and Raman Line Intensity", p. 3.

report to be presented at 1958 Gordon Conference on Infrared Spectroscopy, 18-22 Aug 1958, Kimball Union Acad., Meridian, New Hampshire

AUTHORS: Sokolovskaya, A. I., Bazhulin, P. A. SOV/48-22-9-15/40

TITLE: Investigation of the Temperature Dependence of Line Intensity in Combination Light Dispersion (Issledovaniye temperaturnoy zavisimosti intensivnosti liniy kombinatsionnogo rasseyaniya sveta)

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya fizicheskaya, 1958 , Vol 22, Nr 9, pp 1068 - 1072 (USSR)

ABSTRACT: The dependence of the line intensity of combination light dispersion on temperature was repeatedly investigated in liquid substance (Refs 1-6). The majority of the experimental results which show good agreement indicates that the intensity of the Stokes lines decreases with increasing temperature. Quantitative results, however, as presented by different authors, exhibit considerable discrepancies. The present paper is the continuation of the work covered by reference 7. The authors thoroughly investigated the mentioned dependence. The experiments showed that the intensity of the Stokes combination lines decreases with increasing temperature,

Card 1/3

Investigation of the Temperature Dependence of Line
Intensity in Combination Light Dispersion

SOV/48-22-9-15/40

but the variation is not so high as in the papers cited by references 2-4. It turned out that the change in intensity with temperature does not only depend on the structure of the molecule but also depends on the type of the bindings that take part in the oscillation. As can be seen from table 1 the deformation oscillations are the most temperature dependent ones. Valence oscillations of separate bonds are less sensitive to temperature. Nevertheless no sharp boundary between the behaviour of the intensity of lines with a differing degree of depolarization can be drawn. The half width of the lines and their intensity depend on temperature to a different extent. The assumption that anharmonic features influence the variation of the intensity with temperature disagrees with theoretical calculations. A final explanation of the dependence of the line intensity of combination scattering requires thorough theoretical and experimental investigations. There are 3 figures, 2 tables, and 12 references, 9 of which are Soviet.

Card 2/3

Investigation of the Temperature Dependence of Line
Intensity in Combination Light Dispersion

SOV/48-22-9-15/40

ASSOCIATION: Opticheskaya laboratoriya im.G.S.Landsberga Fizicheskogo
instituta im.P.N.Lebedeva Akademii nauk SSSR (Optics
Laboratory imeni G.S.Landsberg of the Physics Institute
imeni P.N.Lebedev, AS USSR)

Card 3/3

BAZHULIN, P.A.

21(0), 24(0) P. 2, 3 PHASE I BOOK EXPLOITATION

SOV/3250

Akademiya nauk SSSR. Fizicheskiy institut

Issledovaniya po eksperimental'noy i teoreticheskoy fizike; [shornik]
(Studies on Experimental and Theoretical Physics; Collection of
Articles) Moscow, Izd-vo AN SSSR, 1959. 304 p. Errata slip
inserted. 2,300 copies printed.

Ed.: I. L. Fabelinskiy, Doctor of Physical and Mathematical Sci-
ences; Eds. of Publishing House: A. L. Chernyak and V. G. Berkgaut;
Tech. Ed.: Yu. V. Rylyina; Commission for Publishing the Collection
in Memory of Grigoriya Samuilovich Landsberg: I. Ye. Tamm
(Chairman), Academician; M. A. Leontovich, Academician;
P. A. Bazhulin, Doctor of Physical and Mathematical Sciences;
S. L. Mandel'shtam, Doctor of Physical and Mathematical Sciences;
I. L. Fabelinskiy, Doctor of Physical and Mathematical Sciences;
F. S. Landsberg-Baryshanskaya, Candidate of Physical and Math-
ematical Sciences; and G. P. Motulevich (Secretary), Candidate of
Physical and Mathematical Sciences.

PURPOSE: This book is intended for physicists and researchers
engaged in the study of electromagnetic radiations and their role
in investigating the structure and composition of materials.

Card 1/6

3

Studies on Experimental (Cont.)

SOV/3250

COVERAGE: The collection contains 30 articles which review investigations in spectroscopy, sonics, molecular optics, semiconductor physics, nuclear physics, and other branches of physics. The introductory chapter gives a biographical profile of G. S. Landsberg, Professor and Head of the Department of Optics of the Division of Physical Technology at Moscow University, and reviews his work in Rayleigh scattering, combat gases, spectral analysis of metals, etc. No personalities are mentioned. References accompany each article.

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Bazhulin, P. A., V. I. Malyshev, and M. M. Sushchinskiy. The Work of G. S. Landsberg in the Field of Molecular Spectroscopy	17
Card 2/6	

3

LANDSBERG, Grigoriy Samullovich, akademik [deceased]; KAZANSKIY, Boris Aleksandrovich, akademik; BAZHULIN, P.A., doktor fiziko-matemat. nauk; BULANOVA, T.F.; LIBERMAN, A.L., MIKHAYLOVA, Ye.A.; PLATE, A.F.; STERIN, Kh.Ue.; SUSHCHINSKIY, M.M.; TARASOVA, G.A.; UKHOLIN, S.A.; BRUSOV, I.I., red.isd-va; KASHINA, P.S., tekhn.red.

[Determination of the individual hydrocarbon composition of straight-run gasolines by the combined method] Opredelenie individual'nogo uglevodorodnogo sostava benzinov priamoi gonki kombinirovannym metodom. Moskva, Izd-vo Akad.nauk SSSR, 1959. 362 p. (MIRA 12:8)

(Gasoline)

69787

8/055/59/000/06/13/027
B006/B005

24.2410
5.3700(B)

AUTHORS: Ignat'yeva, L. A., Bazhulin, P. A., Bayeva, I. K.

TITLE: The Integral Intensities of Infrared Absorption Bands in the Series of $(CH_3)_nSiCl_{4-n}$ Compounds 1

PERIODICAL: Vestnik Moskovskogo universiteta. Seriya matematiki, mekhaniki, astronomii, fiziki, khimii, 1959, No. 6, pp. 127 - 130

TEXT: This article reproduces a report delivered at the Conference on Chemistry and Use of Organosilicon Compounds in September 1958. The results of infrared absorption spectrum investigations are listed in a table, and subsequently described in detail. To exclude intermolecular interactions, the spectra of the gaseous compounds were recorded at low pressures. The spectra were registered by means of a split-beam infrared spectrometer of the type IKS-2 in the range of from 4,000 to 530 cm^{-1} . A bismuth bolometer with a sensitivity of 25 v/w was used as a radiation receiver. To avoid distortions of the band form, recording was carried out at small velocities. The samples were placed in glass cuvettes, 45 and 100 mm long, with a KCl window. Vapor pressure was measured by a mercury

Card 1/3

4

69787

The Integral Intensities of Infrared Absorption Bands
in the Series of $(\text{CH}_3)_n\text{SiCl}_{4-n}$ Compounds

S/055/59/000/06/13/027
B006/B005

Substance	Oscillation type											
	symmetr. valency- CH_3		asymmetr. valency- CH_3		symmetr. deforma- tion- CH_3		symmetr. valency- Si-C		asymmetr. valency- Si-C		asymmetr. valency- Si-C	
	ν	Δ	ν	Δ	ν	Δ	ν	Δ	ν	Δ	ν	Δ
$(\text{CH}_3)\text{SiCl}_3$	2920	48	2985	103	1266	310	764	490	-	-	575	458
$(\text{CH}_3)_2\text{SiCl}_2$	2920	100	2980	170	1264	370	691	220	804	407	538	258
$(\text{CH}_3)_3\text{SiCl}$	2905	145	2975	280	1261	415	631	105	761	239	-	-
$(\text{CH}_3)_4\text{Si}$	2900	210	2970	360	1259	500	-	-	690	225	-	-

M. I. Batuyev, A. D. Petrov, V. A. Ponomarenko, and A. D. Matveyeva are mentioned.
There are 1 table and 4 references, 1 of which is Soviet.

ASSOCIATION: Kafedra optiki (Chair of Optics)

SUBMITTED: April 23, 1959

Card 3/3

24(7), 5(3)

AUTHORS: Bazhulin, F.A. and Osipova, L.P.

SOV/51-6-5-11/34

TITLE: The Difference Between Energies of Rotational Isomers in Liquid and Gaseous 1,2-fluorochloroethane (Raznost' energii povorotnykh izomerov v zhidkom i gazobraznom 1,2-ftorkhlorethane)

PERIODICAL: Optika i Spektroskopiya, 1959, Vol 6, Nr 5, pp 625-630 (USSR)

ABSTRACT: The paper reports work on the problem of existence and configurations of the stable forms of 1,2-fluorochloroethane ($\text{FH}_2\text{C}-\text{CH}_2\text{Cl}$). The differences between the energies of geometrical isomers in gaseous and liquid phases were also determined. For this purpose the Raman and infrared absorption spectra of 1,2-fluorochloroethane were studied. The Raman spectrum was obtained photographically using a spectrograph ISP-51. The measured frequencies of the Raman lines ($146-3046\text{ cm}^{-1}$), their intensities and the degrees of depolarization are given in Table 1 cols 1, 2 and 3 respectively. The iron spectrum was used as standard. The intensities were estimated visually on a ten-point scale ranging from "very strong" to "very weak". The degree of depolarization of the lines was determined photographically. Instead of the 18 frequencies expected for a non-linear 8-atom molecule (Ref 1) the authors recorded 23 Raman line frequencies (Table 1). This higher number of vibrational frequencies is due to the existence of two

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SOV/51-6-5-11/34

The Difference Between Energies of Rotational Isomers in Liquid and Gaseous
1,2-Fluorochloroethane

isomeric forms of the 1,2-fluorochloroethane molecule. The existence of the two isomeric forms can be confirmed by changes in the spectrum occurring on lowering of temperature. When temperature is lowered, the proportion of the less stable isomer decreases and in the solid phase only the stable form should exist. Unfortunately, the Raman spectra of crystalline 1,2-fluorochloroethane could not be obtained because of a strong background. Consequently the studies were continued by turning to the infrared spectra. A two-beam spectrometer IES-2 was used to obtain the infrared spectrum between 600 and 1500 cm^{-1} . The effect of temperature on the infrared band intensities could be seen in the measured frequencies of the gaseous (col 4 of table 1), liquid (col 5) and crystalline (col 6) states. Fig 1 shows the form of the infrared absorption curves in gas (a) and in liquid (b). Fig 2a shows the absorption spectrum of liquid 1,2-fluorochloroethane in the region 850-700 cm^{-1} at +25 and -50°C. Fig 2b shows the absorption spectrum of the crystal in the region 850-700 cm^{-1} at -186°C. Table 1 and Fig 2 show that the infrared absorption bands at 759 and 1252 cm^{-1} , which are present in the liquid and gaseous phases, have disappeared from the solid 1,2-fluorochloroethane. This confirms that there are two isomers in the gaseous and

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The Difference Between Energies of Rotational Isomers in Liquid and Gaseous
1,2-Fluorochloroethane

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liquid form and one isomer in the solid state. The trans-isomer is more stable in the gaseous phase while the cis-form is stable in the solid and liquid phases. The difference between the energies of the two geometrical isomers in the liquid form was found to be 470 ± 60 cal/mole and the same difference in the gaseous phase was 60 ± 40 cal/mole. These values were deduced from the integral optical densities of the absorption bands of 1,2-fluorochloroethane. Similar values were obtained from the optical densities at the band maxima. Acknowledgments are made to A.M. Prokhorov and I.A. Mukhtarov for their advice. There are 2 figures, 2 tables and 13 references, 7 of which are Soviet, 1 translation from English into Russian and 3 English.

SUBMITTED: June 9, 1958

Card 3/3

SOV/51-6-6-4/34

24(7)
AUTHORS: Bazhulin, P.A. and Smirnov, V.N.

TITLE: Studies of the Temperature Dependence of the Infrared Absorption Band Intensities in Liquids (Issledovaniye temperaturnoy zavisimosti intensivnosti infrakrasnykh polos pogloshcheniya v zhidkostyakh)

PERIODICAL: Optika i spektroskopiya, 1959, Vol 6, Nr 6, pp 745-753 (USSR)

ABSTRACT: Plachek's theory (Ref 1) predicts an increase of the vibrational line intensities with rise of temperature. Available experimental data on Raman spectra (Refs 2-9) show that, in fact, their intensities fall with rise of temperature. The present paper reports a study of the temperature dependence of the intensities of vibrational lines (infrared absorption in the region 3-15 μ) in polar and non-polar liquids. A two-beam spectrometer IKS-2 was used. Liquid was placed in a cell (Fig 1a) made of two rocksalt plates (6) stuck together with caprone (8). The cell was inside an evacuated (10^{-3} mm Hg) glass vessel (1 in Fig 1a), fitted with rocksalt windows (2). The cell temperature was varied by filling an adjacent metal container 4 with either hot air, cold nitrogen gas or liquid nitrogen. The cell temperature was controlled to within 2-3°C and measured with a thermocouple (5). The apparatus used made it

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SOV/51-6-6-4/34

Studies of the Temperature Dependence of the Infrared Absorption Band Intensities in Liquids

possible to carry out measurements between -100 and +180°C. The cell thickness was measured interferometrically. Measured values were corrected for changes in the spectrograph slit widths, liquid density and elastic properties of the cell, as well as for band widths (wings). By way of example spectrograms of the 755 cm^{-1} band of cyclohexanone, the 1093 cm^{-1} of acetone and 3050 cm^{-1} band of chloroform are shown at various temperatures in Figs 2, 3 and 4 respectively. The results are given in Tables 1 and 2 in the form of integral absorption coefficients K_{∞} ($\text{cm}^2\text{mol}^{-1}\text{sec}^{-1}$) which is defined by

$$K_{\infty} = K'_{\infty} \cdot \frac{c \cdot M}{\rho_T} \quad (3)$$

where K'_{∞} is the measured integral absorption coefficient (in cm^{-2}), c is the velocity of light, M is the molecular weight and ρ_T is the liquid density at a temperature T . Table 1 lists the results for six polar liquids: acetonitrile, nitromethane, cyclohexanone, acetone, methyl iodide and chloroform. Table 2 gives the results for seven non-polar liquids: cyclopentane, cyclohexane, n-pentane, n-hexane, benzene,

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SOV/51-6-6-4/34

Studies of the Temperature Dependence of the Infrared Absorption Band Intensities in Liquids

para-xylol and heptene-1. The final two columns of Tables 1 and 2 give the observed (col 7) and Plachek's theoretical (col 8) values of the ratio

$$(K_{\infty})_{T_1}/(K_{\infty})_{T_2}$$

for two temperatures T_1 and T_2 differing by 100°K. The majority of bands fall in intensity with rise of temperature contradicting Plachek's prediction given by Eq (4). This behaviour is ascribed to intermolecular interactions in liquids, but no suggestion are offered about the nature of these interactions. There are 2 tables, 4 figures and 25 references, 10 of which are Soviet, 12 English, 1 French, 1 Austrian and 1 translation from English into Russian.

SUBMITTED: July 7, 1958

Card 3/3

SOV/51-7-2-8/34

AUTHORS: Smirnov, V.N. and Bazhulin, P.A.

TITLE: Investigation of the Temperature Dependence of the Infrared Absorption Band Intensity in Gases. (Issledovaniye temperaturnoy zavisimosti intensivnosti infrakrasnykh polos pogloshcheniya v gazakh)

PERIODICAL: Optika i spektroskopiya, 1959, Vol 7, Nr 2, pp 193-201 (USSR)

ABSTRACT: The intensity of both infrared and Raman spectra of some liquids and solutions is known to fall with increase of temperature, contradicting the theory which predicts a rise of intensity with temperature. It has been suggested that this anomaly is due to strong interactions in the condensed state of the medium (liquid or solution). This suggestion can be checked by finding the temperature dependence of the intensity of vibrational spectra of gases. The intermolecular interactions are much weaker in gases than in liquids or solutions and, therefore, infrared or Raman spectra intensity should rise with temperature. In order to carry out such a study, the authors designed a special cell (Fig 1) which was used to investigate the infrared absorption spectra of gases at various temperatures. The cell was a brass cylinder (1 in Fig 1) with rocksalt windows (4). . . Each window was protected from the ambient medium by an evacuated chamber (2 and 3). The gas in the cell 1

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SOV/51-7-2-8/34

Investigation of the Temperature Dependence of the Infrared Absorption Band Intensity
in Gases

was heated by means of an electric furnace (12) wound on an external jacket. Temperature was measured by means of thermocouples attached to the edges of windows. The fall of temperature between the windows and the centre of the cell did not exceed 10°C. The cell was sealed between measurements and consequently the number of molecules in it remained constant but pressure rose with increase of temperature. The absorption spectra were recorded by means of a two-beam infrared spectrometer IKS-2. The spectrograms recorded were used to obtain optical density. The areas under the bands were measured with a planimeter. At each temperature 3-4 spectrograms were obtained. Correction for the finite width of the slit was found to be small (a few per cent). Radiation emitted by the samples themselves at high temperatures was negligible even at the maximum temperature (+300°C) used in these experiments. The empirical values of the absorption coefficient K_{∞} were determined with an error of 15-20%. The study was carried out on substances which in liquid state showed departures from the theoretical dependence of the infrared absorption intensity on temperature. They were acetone, methyl iodide, chloroform, cyclopentane

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Investigation of the Temperature Dependence of the Infrared Absorption Band Intensity in Gases

and several other simple compounds (C_2Cl_4 , CCl_4 , CS_2 , CH_4 , NO , CO , HCl). The temperature dependence of the infrared absorption intensity of all these substances in gaseous form is given in Table 1. The integral absorption coefficient K_{∞} , quoted in Table 1, was found from

$$K_{\infty} = K'_{\infty} cRT/p \text{ cm}^2 \text{ mole}^{-1} \text{ sec}^{-1},$$

where K'_{∞} is the measured absorption coefficient in cm^{-1} , p is the gas pressure, c is the velocity of light, R is the gas constant and T is the absolute temperature. The values of $K_{\infty} \times 10^{-15}$ are given in Table 1 cols 6 and 7 for $+25^\circ\text{C}$ and $+275^\circ\text{C}$. The empirical values of the ratio $(K_{\infty})_{275^\circ\text{C}}/(K_{\infty})_{25^\circ\text{C}}$ are given in Table 1 col 8 and the theoretical values of this ratio are given in col 9. It is seen that for the majority of bands the intensity does indeed increase with temperature, but often this increase is higher than that predicted by a statistical theory. The main reason for these discrepancies lies in intermolecular interactions, which in gases take the form of collisions. Consequently one would expect that the gas pressure would strongly affect the infrared absorption intensity. To check this the authors used a special cell (Ref 18) which consisted of two approximately equal compartments joined

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Investigation of the Temperature Dependence of the Infrared Absorption Band Intensity in Gases

by a capillary with a tap. All the gas was first placed in one compartment and the pressure was made equal to the maximum pressure used in these experiments. Then the gas was allowed to expand into the other compartment and its pressure fell by a factor of 2. The results (Table 2) show that with increase of pressure the intensities of the majority of bands increase, but the effect of pressure is smaller than the effect of temperature. This is shown in Fig 3, where the intensity of an infrared band of CS_2 is shown at various temperatures and pressures. There are 3 figures, 2 tables and 36 references, 5 of which are Soviet, 23 English and 8 German.

SUBMITTED: October 31, 1958

Card 4/4

5 (3), 24 (7)

AUTHORS: Markova, S. V., Bazhulin, P. A.,
Stanko, V. I., Plate, A. F.

SOV/62-59-7-18/38

TITLE: Optical Method of Investigation of Hydrocarbons (Opticheskiy metod issledovaniya uglevodorodov). Communication 11. Raman Spectra of Dicyclopentyl and Dicyclopentyl Alkanes (Soobshcheniye 11. Spektry kombinatsionnogo rasseyaniya ditsiklopentila i ditsiklopentilalkanov)

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 7, pp 1280 - 1287 (USSR)

ABSTRACT: The present paper is a continuation of a series of papers (Refs 1-10) on the investigation of the Raman spectra of hydrocarbons carried out in the optical laboratory of the Fizicheskiy institut im. P. N. Lebedeva, AN SSSR (Institute of Physics imeni P. N. Lebedev of the AS USSR) and in the laboratory of the Komissiya po spektroskopii (Committee of Spectroscopy), together with the institute mentioned in the Association. The results of the investigation of the Raman dispersion of 8 hydrocarbons (dicyclopentyl and its alkanes) are given. The following parameters of the Raman lines were determined: the frequency $\Delta\nu$, the intensity in the line maximum

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Optical Method of Investigation of Hydrocarbons.
Communication 11. Raman Spectra of Dicyclopentyl
and Dicyclopentyl Alkanes

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(I_0), the integral intensity (I_∞) the line width δ and the depolarization degree (ρ). The frequencies and the intensity maxima were measured by means of the spectrograph ISP-51. The integral intensity was determined by means of a diffraction grating constructed by Sushchinskiy (Ref 12). All results of the integral intensity were expressed on a scale with the integral intensity of the line of cyclohexane of 802 cm^{-1} equal 500. The spectra of the investigated substances consisted of weak and diffuse lines. The mean error of the integral intensity amounted to $\sim 10\%$. The depolarization degree was measured by means of a Zeiss spectrograph. A special illumination system was constructed for the surveys. The results of the measurements of frequency, intensity, and depolarization degree are given in table 1. The purity of the investigated substances was examined before the survey. The determined frequencies, the production, the physical and chemical properties of the investigated substances: dicyclopentyl-methane, 1,2-dicyclopentylethane, 1,3-dicyclopentylpropane, 1,4-dicyclopentylbutane,

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1,5-dicyclopentylpentane, 1,1-dicyclopentylethane, and 1,2-dicyclopentylpropane are given in brief. The following conclusions were drawn from the results (only the spectrum of the dicyclopentyl is known in the publications): the most intensive line at $\sim 895 \text{ cm}^{-1}$ found in all spectra was ascribed to the fully symmetrical oscillation of the five-membered ring as its characteristic. Table 2 gives the values of the integral intensity of this line of all 8 substances investigated, the mean value is at 340. The integral intensity of a compound with one ring only amounts to only the half. The intensities for the different low frequencies are represented in table 3. Lines are found here which correspond to the oscillations of the CH_2 -group. The intensity of these lines increases with the increase of the chain between the two five-membered rings. The most intensive line at 600 cm^{-1} is reduced with the increase of the distance between the rings. The lines of the frequencies of $200 - 600 \text{ cm}^{-1}$ were characteristic of the individual hydrocarbons. There are 3 tables and 26 references, 21 of which are Soviet.

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Communication 11. Raman Spectra of Dicyclopentyl and
Dicyclopentyl Alkanes

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ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR
(Institute of Physics imeni P. N. Lebedev of the Academy of
Sciences, USSR). Institut organicheskoy khimii im. N. D.
Zelinskogo Akademii nauk SSSR (Institute of Organic Chemistry
imeni N. D. Zelinskiy of the Academy of Sciences, USSR)

SUBMITTED: November 1, 1957

Card 4/4

7(3),5(4)

AUTHORS:

Markova, S. V., Bazhulin, P. A.

SOV/48-23-10-6/39

TITLE:

The Determination of the Coefficients of the Infrared Absorption of the CH_2 -Group in Dicyclic Compounds

PERIODICAL:

Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959, Vol 23, Nr 10, pp 1186-1188 (USSR)

ABSTRACT:

The present paper contains a report on the use of absorption spectra in the infrared for the determination of the number of CH_2 -groups in high-boiling complex hydrocarbons. The authors determined the absorption coefficients for the CH_2 -group in the connecting chain of five-membered cyclic hydrocarbons. Whereas hitherto e.g. the influence exercised by the gap width of the monochromator upon band contour has not been taken into account in similar investigations (Refs 1-4), the authors take all apparatus influences into account. The absorption coefficients within the range of 730 cm^{-1} were measured of some dicyclanes of the structure $\text{[]}-(\text{CH}_2)_n-\text{[]}$ ($n = 2,3,4,5$), and also of some normal paraffins and naphthenes. Carrying out of the

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The Determination of the Coefficients of the Infrared
Absorption of the CH_2 -Group in Dicyclic Compounds

SOV/48-23-10-6/39

experiments is described in short. Table 1 shows the band maxima 757, 737, 729 and 726 cm^{-1} for $n=2,3,4,5$, the absorption coefficients K_0 are given as 8.1, 15, 20 and $28.10^3\text{ cm}^2/\text{Mol}$ and K_∞ as 31, 31,38 and $53.10^4\text{ cm}^2/\text{Mol}$. The ν -values for the paraffins and naphthenes (band maxima) are determined as amounting to 750, 728, 726 and 723 cm^{-1} (Table 2, same order $n=2..5$).

Figure 1 as an example gives the band (729 cm^{-1}) of 1,4-dicyclopentyl butane, which has a distinctly marked flat intensity maximum. Figure 2 shows the dependence of the integral absorption coefficient K_∞ on n for dicyclane, n -paraffin and mono-substituted naphthene (straight line). Figure 3 shows the same for K_0 .

The corrections for the gap width were carried out graphically according to a method developed by Rautian (Ref 7). A comparison between the results obtained by the authors and other data given

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The Determination of the Coefficients of the Infrared Absorption of the CH_2 -Group in Dicyclic Compounds SOV/48-23-10-6/39

in publications show that the frequency of the band $\sim 730 \text{ cm}^{-1}$ in the case of five-membered dicyclic hydrocarbons has the same dependence on n as in the case of paraffins and naphthenes. There are 3 figures, 2 tables, and 8 references, 4 of which are Soviet.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR
(Physics Institute imeni P. N. Lebedev of the Academy of Sciences, USSR)

Card 3/3

24 (7)

AUTHORS:

Bazhulin, P. A., Sushchinskiy, M. M. SOV/53-68-1-10/17

TITLE:

Methods of Measuring the Raman-line Intensity of Light
(Metody izmereniya intensivnostey liniy kombinatsionnogo
rasseyaniya sveta)

PERIODICAL:

Uspekhi fizicheskikh nauk, 1959, Vol 68, Nr 1, pp 135-146 (USSR)

ABSTRACT:

This article gives a survey of this special field, its possibilities and methods. First, the authors discuss the question which quantities must be measured and which measuring methods are necessary for a definite identification of the substance under investigation. In the experimental spectral investigation of Raman lines some difficulties arise which occur only in individual cases during the investigation of emission spectra. They are particularly due to the fact that the Raman lines are very weak and their background is relatively distinct, further, that these lines are rather wide. The difficulties are discussed in short, and the line contours as well as the corresponding possibilities of determination are then described (application of the spectral apparatus DFS-4, DFS-12). Figure 1 shows the contours in case (1) of dispersion form $p/q = \infty$, $r = 1$; (2) Gaussian form

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Methods of Measuring the Raman-line Intensity of Light SOV/53-68-1-10/17

$p/q = 0$, $r = 1.47$; (3) Voigt form $p/q = 0.6$, $r = 1.208$. It is necessary to determine the intensity in the maximum I_0 , the total intensity (surface under the contour curve) I_{∞} , and the half width δ which characterizes the line width. A usually accepted coefficient is also the "effective half width" δ_{eff} for which it holds: $\delta_{eff} = 2I_0/\pi I_{\infty}$; $r = \delta/\delta_{eff}$. An analytical approximation to the plotted curve is possible due to (1) the "slit"-apparatus function (rectangle for spectrographs; trapezoid for monochromators with differently wide inlet- and outlet slit; triangle for monochromators with equal slit widths); (2) the Gaussian function; (3) the dispersion function, and (4) a function suggested by the authors which is characterized by two parameters (line width and deviation from the dispersion form). The ratios are illustrated by representations of these curves (see also Table 1) and are discussed in a very detailed manner. In conclusion, the authors refer to the problem of measuring the intensity of Raman lines and particularly to the possibilities offered by ratio determinations with the help of comparative standard lines

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Methods of Measuring the Raman-line Intensity of Light SOV/53-68-1-10/17
(459 cm^{-1} of CCl_4). There are 5 figures, 3 tables, and
17 references, 14 of which are Soviet.

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68885

S/051/60/008/02/011/036

E201/E391

5.4130

AUTHORS: Bazhulin, P.A. and Lazarev, Yu.A.

TITLE: Investigation of the Raman Spectra in Gases at Low Pressures Using a Photoelectric Method

PERIODICAL: Optika i spektroskopiya, 1960, Vol 8, Nr 2, pp 206 - 213 (USSR)

ABSTRACT: The authors recorded and measured intensities, widths and contours of the rotational and vibrational Raman lines of vapours and gases at pressures of 1-10 atm and temperatures of 30-250 °C. The apparatus used consisted of: (a) a DFS-4 spectrometer with a plane reflection grating with 1 200 lines /mm, a linear dispersion of 6.4 Å/mm and a relative aperture of 1:10; (b) a multiple-reflection cell (with dielectric or aluminized mirrors reflecting 90-95% of light at 4 000 - 5 000 Å) of 600 mm length and 40 mm diameter and two focusing condenser lenses; (c) two low-pressure cooled mercury lamps of 600 mm length; (d) a screening jacket internally coated with MgO. A battery-fed photomultiplier FEU-17 was used as a receiver. The authors investigated pure

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The optical cross-section for oxygen, obtained for the authors at 1-10 atm, agreed quite well with the value of 4.5 \AA found by Mikhaylov (Ref 10) from the rotational Raman spectra at pressures of 10-100 atm, and with the value of 4.35 \AA deduced by Anderson at al (Ref 19) from the microwave rotational spectrum of O_2 (magnetic absorption) at pressures of 0.1 - 12 mm Hg. Table 2 lists values of the collision cross-sections calculated from the gas-kinetic theory. The greatest differences between the optical and gas-kinetic values of the cross-sections occurred in the case of H_2 (< 1 and 2.7 \AA , respectively) and in the case of CO_2 (9 and 4.5 \AA , respectively). Analysis of the vibrational spectra (Tables 3 and 4, Figures 3-5) led to the following results: a) all broad lines are asymmetrical; b) the contours and widths of strongly polarized lines

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(ν_1 and $2\nu_2$ of H_2 , O_2 , N_2 , CO_2 , ν_1 of CH_4) were
independent of pressure between 1 and 10 atm.
Acknowledgment is made to I.I. Sobel'man for his advice.
There are 5 figures, 4 tables and 34 references, 18 of
which are Soviet, 11 English, 1 German and
4 Translations. 4

SUBMITTED: June 22, 1959

Card 4/4

S/051/60/008/04/010/052

E201/E691

AUTHORS: Markova, S.V., Bashulin, P.A., Plate, A.F. and Stanko, V.I.

TITLE: Investigation of the Infrared Absorption Spectra²¹ of Dicyclic Hydrocarbons ✓

PERIODICAL: Optika i spektroskopiya, 1960, Vol 8, Nr 4, pp 492-497 (USSR)

ABSTRACT: The authors investigated the infrared absorption spectra of five-member and six-member dicyclic hydrocarbons in the region from 3 to 24 μ . The majority of the five-member compounds was first prepared in the Laboratory of Catalytic Synthesis of the Institute of Organic Chemistry imeni N.D. Zelinskiy (Ref 1). The results reported in the present paper supplement those on the Raman spectra of the same compounds reported by Markova et al. (Ref 2) and Peregudov et al. (Ref 3). All measurements were made with a "double-beam" spectrometer, consisting of a standard monochromator IKS-11 and an automatic device developed in the authors' laboratory (Ref 4). In the 3 μ region the compounds were dissolved in CCl_4 (1% concentration) before measurements. In other regions of the spectrum pure compounds were employed. The effects of scattered and reflected light were allowed for by placing a cell with the appropriate compound in the

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S/OS1/60/008/04/010/032

E201/E691

Investigation of the Infrared Absorption Spectra of Dicyclic Hydrocarbons

calibration beam as well as in the working beam. Table 1 lists the infrared frequencies of all the compounds investigated. The errors in determinations of the frequencies varied between 1 and 2 cm^{-1} depending on the region of the spectrum. Table 1 lists also the estimated absorption intensities using a five-degree scale: very strong, strong, medium, weak, very weak. Fig 1 shows by way of illustration the spectra of dicyclohexyl between 700 and 1500 cm^{-1} and Fig 3 shows the absorption spectra of six hydrocarbons in the $\sim 3000 \text{ cm}^{-1}$ region. Tables 2-5 list the measured values of the absorption coefficients of certain selected bands. Table 6 compares the Raman and infrared spectra of some of the compounds studied. For some bands the authors investigated dependence of the integral absorption coefficient and the absorption coefficient at the band maxima on the number of absorbing groups in a molecule. Fig 2 shows that the integral absorption coefficient rises linearly with the number of absorbing CH_2 groups. A similar linear dependence ("additivity") was found for

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S/051/60/008/04/010/032

E201/E691

Investigation of the Infrared Absorption Spectra of Dicyclic Hydrocarbons

the absorption coefficient at the band maxima. There are 3 figures, ✓
6 tables and 17 references, 9 of which are Soviet, 4 English,
2 German, 1 mixed (English and German) and 1 from Spectrochimica Acta.

SUBMITTED: July 16, 1959

Card 3/3

37771

15.8170
5.5310

S/661/61/000/006/062/031
D243/D302

AUTHORS: Ignat'yeva, L. A., Bazhulin, P. A. and Bayeva, I. K.

TITLE: The intensities of the infrared absorption bands of sili-co-organic compounds of the series $(\text{CH}_3)_n\text{SiCl}_{4-n}$

SOURCE: Khimiya i prakticheskoye primeneniye kremneorganicheskikh soedineniy; trudy konferentsii, no. 6: Doklady, diskussii, resheniye. II Vses. konfer. po khimii i prakt. prim. kremneorg. soyed., Len. 1958. Leningrad Izd-vo AN SSSR, 1961, 277-282

TEXT: The authors studied the integral intensities of the infrared absorption bands of the above compounds, where $n = 1, 2, 3, 4$, and follow the change of intensity and frequency of the absorption bands for separate bonds in the molecule when Cl's were substituted by CH_3 groups. All investigations were carried out in the vapor phase at low pressures to exclude intermolecular reactions. The spectra were recorded with a two-ray NKC-2 (IKS-2) infrared spectrometer

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The intensities of ...

S/661/61/000/006/062/081
D243/D302

in the region 4000 to 530 cm^{-1} , a bismuth bolometer acting as radiation receiver and the spectra being recorded at low speeds to avoid distortion. The experiments were carried out at 4 mm and 10 mm pressures. The average error in measuring the integral intensity was 20 - 25%. A. L. Smith's interpretation of the I-R absorption bands was accepted but the 761 cm^{-1} frequency band was taken as the valence asymmetric oscillation of Si-C in $(\text{CH}_3)_3\text{SiCl}$. The results are given in tabulated form and show the characteristic changes which occur. It is suggested that the rise in intensity of the Si-C oscillation may be due to the large difference in electronegativity between the Si atoms (1.8) and the Cl atoms (3.0), which increases the dipole moment of the Si-C bond. Reference is made to the work of M. I. Batuyev, A. D. Petrov, V. A. Ponomarenko and A. D. Matveyeva in this connection. Also, with a high number of chlorine atoms in the molecule, changes in dipole moment of the Si-Cl bonds may have an induction effect on the Si-C bonds, and cause the oscillation intensity of the latter to rise. There are 1 table and 4 references: 1 Soviet-bloc and 3 non-Soviet-bloc. The references to

X

Card 2/3

The intensities of ...

S/661/61/000/006/062/081
D243/D302

the English-language publications read as follows: T. Shimanouchi, I. Tsuchiya and Y. Mikawa, J. Chem. Phys., 18, 1306, (1950); I. Duchesne, J. Chem. Phys., 16, 1006, (1948).

ASSOCIATION: Moskovskiy gosudarstvenny universitet im. L. V. Lomonosova (Moscow State University im. M. V. Lomonosov)

Card 3/3

X

BAZHULIN, P.A.; MANDEL'SHTAM, S.L.; STRIGANOV, A.R.

Conference on optics and spectroscopy. Vest. AN SSSR 31 no.2:91-
92 F '61. (MIRA 14:2)
(Optics—Congresses)

BABUSHKIN, Aleksandr Afanas'yevich, dots.; BAZHULIN, Pavel Alekseyevich, prof.; KOROLEV, Fedor Andreyevich, prof.; LEVSHIN, Leonid Vadimovich, prof.; PROKOP'YEV, Vladimir Konstantinovich, prof.; STRIGANOV, Arkadiy Romanovich, doktor fiziko-matem. nauk; GOL'DENBERG, G.S., red.; GEORGIYEVA, G.I., tekhn. red.

[Spectrum analysis methods] Metody spektral'nogo analiza. [By] A.A. Babushkin i dr. Pod red. V.L. Levshina. Moskva, Izd-vo Mosk. univ., 1962. 508 p. (MIRA 16:2)
(Spectrum analysis)

BAZHULIN, P.A.; LAZAREV, Yu.A.; DESYATOVA, N.V.

Intensity and degree of polarization of the lines of the vibrational
Raman spectrum of gaseous butadiene. Opt.1 spektr. 13 no.1:75-78
Jl '62. (MIRA 15:7)

(Butadiene—Spectra)

S/053/62/077/004/003/006
B102/B104

AUTHOR: Bazhulin, P. A.

TITLE: Rotation and rotation-vibration spectra of gases examined by the method of Raman light-scattering

PERIODICAL: Uspekhi fizicheskikh nauk, v. 77, no. 4, 1962, 639 - 648

TEXT: This paper reproduces a lecture given on February 12, 1962 during a session of the Uchenyy sovet FIAN SSSR (Scientific Council of the FIAN SSSR), in memory of G. S. Landsberg who had directed an optical laboratory dealing mainly with molecular spectroscopy. It surveys photographic and photoelectric methods, subjects of research (H_2O_2 , N_2 , CO_2 , C_2H_2 , CH_4 , CO pure and mixed with He, Ar or CH_4) and the most important results obtained, with particular attention to oxygen and the Q-branch (O_2 , N_2 , CO_2 , CH_4).

All this concerns research work recently carried out at the above-mentioned Institute. Among other things it has proved possible fully to explain both the asymmetry and the width of the Q-band as being due to the Q-branch

Card 1/2

Rotation and rotation-vibration ...

S/053/62/077/004/003/006
B102/B104

splitting which results from interaction between vibration and rotation and from Coriolis interaction of the vibrations. As the true half-width of a single component in the Q-bands of strongly polarized lines at pressures of up to 10 atm is less than 0.3 cm^{-1} this could not be measured. Some Q-band components of depolarized $\nu_2\text{CH}_4$ lines reached a half-width of 1.5 cm^{-1} . There are 7 figures and 5 tables.

Card 2/2

KUSAKOV, Mikhail Mikhaylovich; SHIMANKO, Nina Aleksandrovna; SHISHKINA, Margarita Vladimirovna; BAZHULIN, P.A., doktor fiziko-matem. nauk, otv. red.; LOSKUTOVA, I.P., red.; POLYAKOVA, T.V., tekhn. red.

[Ultraviolet absorption spectra of aromatic hydrocarbons]Ul'tra-fioletovye spektry pogloshcheniia aromaticeskikh uglevodorodov. Moskva, Izd-vo Akad. nauk SSSR, 1963. 269 p. (MIRA 16:2)
(Hydrocarbons--Absorption spectra)

GRIBOV, Lev Aleksandrovich; BAZHULIN, P.A., doktor fiz.-matem. nauk, prof., otv. red.; MEDER, V.M., red.; SUSHKOVA, L.A., tekhn. red.

[Theory of intensity in the infrared spectra of polyatomic molecules] Teoriia intensivnosti v infrakrasnykh spektrakh mnogoatomnykh molekul. Moskva, Izd-vo AN SSSR, 1963. 151 p. (MIRA 16:10)

(Molecular spectra) (Spectrum, Infrared)

L 18385-63 EWT(1)/EWP(q)/EWT(m)/BDS/ES(s)-2 AFFTC/ASD/ESD-3/IJP(C)/SSD
ACCESSION NR: AP3003869 Pt-4 GG/RDW/JD S/0181/63/005/007/1783/1790 75
74

AUTHORS: Bazhulin, P. A.; Myasnikova, T. P.; Rakov, A. V.

TITLE: Investigation of the vibrational spectra of some ferroelectric materials by combination scattering of light

SOURCE: Fizika tverdogo tela, v. 5, no. 7, 1963, 1783-1790

TOPIC TAGS: ferroelectricity, combination scattering, vibrational spectrum, ammonium, sulfate, selenate, Rb, Li, Na

ABSTRACT: The authors have obtained and studied the spectra of combination scattering in the ferroelectric compounds $(\text{NH}_4)_2\text{SO}_4$, NH_4HSO_4 , RbHSO_4 , $\text{LiH}_3(\text{SeO}_3)_2$, and $\text{NaH}_3(\text{SeO}_3)_2$ at room and lower temperatures near the point of phase transition. From these spectra they have measured the width and relative intensities of the bands and have discovered a dependence of band intensity on orientation of crystal for spectral excitation in natural and artificial light. In addition to the bands corresponding to internal vibration of the SO_4^{2-} ion, several "extraneous" bands were found in the spectra of sulfates and bisulfates. However, low-frequency vibrations declining in frequency at the Curie point were not observed. The authors

Card 1/2

L 18385-63

ACCESSION NR: AP3003869

conclude that their work makes possible reliable interpretations of the spectra of the investigated crystals in the frequency range of $300-1200\text{ cm}^{-1}$. The study of temperature dependence near the phase transition has shown that the vibrational frequencies of the SO_4^{--} and SeO_3^{--} radicals change insignificantly with temperature. Orig. art. has: 2 figures and 8 tables.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR, Moscow (Physical Institute, Academy of Sciences, USSR)

SUBMITTED: 07Jan63

DATE ACQ: 15Aug63

ENCL: 00

SUB CODE: PH

NO REF SOV: 004

OTHER: .012

Card 2/2

BAZHULIN, P.A., doktor fiz.-matem.nauk; DERKACHEVA, L.D., kand.fiz.-matem.nauk

Congress on quantum radio physics. Vest. AN SSSR 33 no.8:91-93
Ag '63. (MIRA 16:8)

(Quantum theory) (Radio)

RAKOV, A.V.; BAZHULIN, P.A., doktor fiziko-matem. nauk, prof., nauchnyy
rukovoditel' raboty

Study of the Brownian movement of molecules of condensed substances
using the methods of Raman scattering and infrared absorption.
Trudy Fiz. inst. 27:111-149 '64. (MIRA 17:9)

ACCESSION NR: AP4020972

8/0051/64/016/003/0536/0538

AUTHOR: Bazhulin, P. A.; Maly*shev, V. I.; Markin, A. S.; Rakov, A. V.;
Bagdasarov, Kh. S.

TITLE: Investigation of the luminescence and stimulated emission spectra of different CaF_2 crystals doped with U^{3+}

SOURCE: Optika i spektrokopiya, v. 16, no. 3, 1964, 536-538

TOPIC TAGS: stimulated emission, laser, uranium ion luminescence, trivalent uranium, trivalent uranium emission, trivalent uranium luminescence, calcium fluoride, uranium doped calcium fluoride, luminescence center, lasing center

ABSTRACT: Investigators (P.P.Sorokin and M.J.Stevenson, Phys.Rev.Letters, 5, 557, 1960; and Adv.in Quant.Electr. 65, 1961) have observed stimulated emission (laser output) from $\text{CaF}_2:\text{U}^{3+}$ crystals, but in different specimens exhibit different wavelengths (2.5, 2.6, and 2.24 μ). These differences are attributed to different symmetry of the field about the U^{3+} ions in the crystal lattice. The authors investigated different $\text{CaF}_2:\text{U}^{3+}$ crystals grown at the Institute of Crystallography of the Academy of Sciences; some lased only at 2.5 or 2.6 μ , but a few specimens exhibited stimulated emission simultaneously at 2.510 ± 0.005 and $2.605 \pm 0.005 \mu$.

Cord 1/3

ACCESSION NR: AP4020972

These are referred to as "mixed" crystals. In view of the desirability in some cases of having a laser with several wavelengths in the present work there were studied and compared the luminescence and stimulated emission spectra of the "mixed" crystals and, for comparison, of the "single-wavelength" crystals. The luminescence spectra were recorded under infrared flash tube excitation by means of a ZMR-3 mirror monochromator equipped with an InSb detector. The spectra were recorded at different temperatures in the range from 0 to -175°C. In the luminescence spectra of "mixed" crystals there appear lines at both 2.5 and 2.6 μ ; with decrease in temperature these become narrower, and the 2.6 μ line become relatively more intense. The same two lines, exhibiting the same temperature behavior, were observed in the luminescence spectra of the "simple" crystals yielding stimulated emission only at 2.6 μ . It is inferred from the behavior of the different crystals that the "mixed" crystals may be regarded as a mechanical mixture of two different forms of U^{3+} ions, with different symmetry, which emit independently of one another. This inference is supported by the results of measuring the temperature dependences of the lasing threshold for the "2.5 μ ", "2.6 μ ", and "mixed" crystals; the different types of U^{3+} ions (centers) act as independent sources of coherent radiation. During the preparation of the present report a paper by J. Wittke, Z. Kiss,

Card 2/3

ACCESSION NR: AP4020972

R. Duncan, and J. McCormick (Proc.IEE,51,56,1963) appeared, reporting similar studies and some of the same inferences. Orig. art. has: 2 figures.

ASSOCIATION: none

SUBMITTED: 31May63

DATE ACQ: 02Apr64

ENCL: 00

SUB CODE: PH

NR REF SOV: 002

OTHER: 004

Cord 3/3

BAZHULIN, P.A.; RAKOV, A.V.; RAKHIMOV, A.A.

Low-frequency Raman spectrum of crystalline n-dichlorobenzene
at various temperatures. Opt. i spektr. 16 no.6:1027-1030 Je '64.
(MIRA 17:9)

BAZHULIN, P.A.; BEKMEDOVA, N.G.

Effect of the state of aggregation on the intensity of infrared
absorption bands. Vest. Mosk. un. Ser.3:Fiz., astron. 19
no.1:50-55 Ja-F '64. (MIRA 17:4)

1. Kafedra optiki Moskovskogo universiteta.

L 10402-05

ACCESSION NR: AP4047930

[illegible]

ASSOCIATION: Physiologic Institute named N. N. Lebedev, AN SSSR
(Physiol. Institute, AN SSSR)

SUBMITTED: 09 Jun 64

ATD PRESS: 3116

ENCL: 00

SUB CODES: EC, ME

NO REF 307, 000

OTHER: 002

Card 212

L 25077-05 ENT(1)/ENT(R)/ESP(J)/ESP(t) Po-I/Peb IJP(c) GG/RH

ACCESSION NR: AP5003418

S/0181/65/007/001/0094/0099

AUTHORS: Bazhulin, P. A.; Rakhimov, A. A.

TITLE: Investigation of "low frequency" Raman spectrum of crystalline stilbene and tolane at different temperatures

SOURCE: Fizika tverdogo tela, v. 7, no. 1, 1965, 94-99

TOPIC TAGS: Raman spectrum, temperature dependence, frequency dependence, integral intensity, linewidth, stilbene, tolane

ABSTRACT: This is a continuation of earlier work by the authors (with A. V. Rakov, Opt. i spektr. v. 16, 111, 1964), devoted to a study of the temperature dependence of the frequency, relative intensity, and line width of the spectrum of a polycrystalline substance having two molecules per unit cell. The present investigation was aimed at studying the temperature dependence of the same parameters for a crystal lattice with four molecules per unit cell.

Cord

1/3

L 25077-45

ACCESSION NR: AP5003418

such as polycrystalline stilbene with melting point 124C, and polycrystalline tolane with melting point 60.2C, the unit cells of both being characterized by a space group of symmetry C_{2k}^5 . The spectrum was recorded with a DFS-12 spectrometer with double monochromatization, using a low-pressure mercury lamp. The experimental procedure was described in the earlier paper. The temperature dependence of the frequency, integral intensity, and line width of Raman scattering at low frequencies were determined in the temperature intervals 123--373K for stilbene and 123--323K for tolane. With decreasing temperature, an increase in the frequency is observed, the growth being slowed down at lower temperatures. Ten lines were observed in the stilbene crystal and 12 in the tolane spectrum; the integral intensities of the most reliable lines, those not overlapped by the wings of the neighboring lines, were measured. The measurements have shown that the relative integral intensity of the stilbene and tolane lines increases with increasing temperature, and changes for several of the lines by 3--4 times in the temperature interval 123--

Cord

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L 25077-65

ACCESSION NR: AP5003418

373K. The line widths increased with increasing temperature, but in unequal fashion. Other aspects of the result are discussed. It is pointed out in conclusion that investigations of the temperature dependence of low-frequency lines by Raman scattering makes it possible to ascribe the lines to particular lattice vibrations in many cases. "The authors thank A. V. Rakov for participating in the discussion of the work." Orig. art. has: 5 figures, 1 formula and 2 tables. ²

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR
(Physics Institute, AN SSSR)

SUBMITTED: 26Jun64

ENCL: 00

SUB CODE: SS,OP

NR REF SOV: 007

OTHER: 002

Cord

3/3

1 37687-65 EWT(1)

ACCESSION NO. ADP 1111

AUTHOR: ADRIANOV, V.M., BAKALOV, I.A.

TITLE: Investigation of the temperature dependence of low-frequency Raman spectra of KDP and ADP crystals

REPORT: Phys. Lett., 1976, v. 57, p. 100, 101, 102, 103

DESCRIPTORS: Dielectric properties; Ferroelectricity; Raman spectra; Temperature dependence

ABSTRACT: The purpose of the study was to determine the low-frequency Raman spectra of KDP and ADP crystals near the Curie points. The Raman spectra of these crystals were measured in the temperature range 10-100°C. The results show that the Raman spectra of KDP and ADP crystals near the Curie points are characterized by a sharp increase in the intensity of the Raman scattering at low frequencies.

The Raman spectra of KDP and ADP crystals were measured in the temperature range 10-100°C. The results show that the Raman spectra of KDP and ADP crystals near the Curie points are characterized by a sharp increase in the intensity of the Raman scattering at low frequencies. The Raman spectra of KDP and ADP crystals near the Curie points are characterized by a sharp increase in the intensity of the Raman scattering at low frequencies.

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ACCESSION NR: AF5005275

2

sample temperature was maintained constant within 3K. Three to five spectra were taken for each temperature. The normal oscillations of the crystals are calculated by group theory, and it is shown that oscillations which are active up to the ferro-electric phase transition can appear also in the Raman spectra. The temperature

of the transition is determined by the Raman spectra. The Raman spectra of the crystals are shown in Figure 1. Both crystals exhibit oscillations whose frequency varies with temperature. The frequency of the oscillations is shown in Figure 2. It is concluded that the oscillations are interpreted as the ferro-electric phase transition. The Raman spectra of the crystals are shown in Figure 1. Both crystals exhibit oscillations whose frequency varies with temperature. The frequency of the oscillations is shown in Figure 2. It is concluded that the oscillations are interpreted as the ferro-electric phase transition.

and the Raman spectra.

ASSOCIATION: Phys. Rev. Lett. 17, 1048 (1966) AN 66014 AN 66014 M. S. W. Raman, Institute AN 335A

SUBMITTED: 14Jul64

ENCL: 00

SUB CODE: 55, CP

NO EFF. PAY: 11

WORKS: 11

ATTN: 3218

Card: 11

L 58878-65 REC(b)-2/ZWT(1)/T P1-4 IJP(c) CG
ACCESSION NR: AP5017303

UR/0181/65/007/007/2088/2093

AUTHOR: Bazhulin, P. A.; Rakhimov, A. A.

TITLE: Low frequency Raman scattering spectra of some organic crystals at various temperatures

SOURCE: Fizika tverdogo tela, v. 7, no. 7, 1965, 2088-2093

TOPIC TAGS: Raman spectrum, Raman scattering, combination scattering, crystallography

ABSTRACT: The work is a continuation of the authors' previous investigations and considers the temperature dependence of frequencies, total intensity and width of low frequency Raman scattering lines for polycrystalline naphthalene, diphenyl and pyrene in the 123-173°K temperature range. The IFB-12 photoelectric spectrophotometer was used. It was found that frequencies increase when temperature decreases which is apparently associated with variation in the quasi-elastic forces. Total line intensity increases with temperature and is in agreement with theoretical values within approximately 20%. In many cases the relative intensity varies by a factor of 3 to 4 when the temperature is increased. Line width varies linearly with

Cord 1/2

L 58878-65

ACCESSION NR: AP5017303

2

temperature for many frequencies. This shows that the relationship based on the model of an anharmonic oscillator is valid. An evaluation is made of the potential barriers showing that they vary from 3 to 6 kcal/mol. "In conclusion we thank A. V. Bakov for participating in the discussion of this work." Orig. art. has: 4 figures, 4 tables.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR, Moscow (Physics Institute AN SSSR)

SUBMITTED: 01Feb65

ENCL: 00

SUB CODE: SS, *NP*

NO REF SOV: 012

OTHER: 000

Card ^{1/2} 2/2

1. 05513-05 E-T(m)/EMP(j)/T/EMP(i)/EMP(b) PC-4 IJP(c) JD/33/AM
 REFERENCE NO. AF5006146 8/0051/65/018/003/ 526/0549

ACQUISITION: Razdovik, R. A.; Berkacheva, L. I.; Chislanov, S. I.; Perekhodov, I. V.
1970-01-10 1970-01-10 1970-01-10 1970-01-10

1111 Investigation of stimulated emission in solutions of rare-earth chelates

1111 1. Chelates of rare-earth elements, p. 12, no. 1, 1975, 50-51, 50-51, 50-51

1111 2. Chelates of rare-earth elements, p. 12, no. 1, 1975, 50-51, 50-51, 50-51
 material.

ABSTRACT: To check on the feasibility of using rare-earth chelates for stimulated emission, the authors investigated the properties of the following compounds: 1. Chelates of rare-earth elements, p. 12, no. 1, 1975, 50-51, 50-51, 50-51

1111 3. Chelates of rare-earth elements, p. 12, no. 1, 1975, 50-51, 50-51, 50-51

Card 1/3

L 93618-65

ACCESSION NR: AP5006446

Properties of the investigated compounds were investigated. Physical data on the compounds were determined. The authors are grateful to V. V. Kuznetsova and L. A. Novikova for synthesis and supply of some of the investigated compounds." 2

art. has: 4 figures, 1 formula, and 2 tables. [02]

ASSOCIATION: 0 0

SUBMITTED: 13Apr64

ENCL: 01

SUB CODE: EC, IC

REF SOV: 000

OTHER: 002

ATTN: 3220

Card 2/3

L 35618-63

RETIQUEF 01

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Card 3/3

L 36342-65 EWG(j)/EWA(k)/FBD/EWT(1)/EEC(k)-2/EEC(t)/T/EEC(b)-2/3WP(k)/EWA(m)-2

ACCESSION NR: AP5008759 EWA(h) Pn-4/Po-4/Pf-4/Peb 8/0056/65/048/003/0975/0976

Pi-4/Pl-4 IJP(c) WG

AUTHOR: Bazhulin, P. A.; Knyazev, I. N.; Petrash, G. G.

TITLE: Possibility of obtaining stimulated emission in the far-ultraviolet spectral region

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 48, no. 3, 1965, 975-976

TOPIC TAGS: laser, stimulated emission, molecular laser, chemical laser, hydrogen laser

ABSTRACT: The possibility of obtaining laser action in the far-ultraviolet region by means of transitions between the upper electronic state $2p^2\ ^1\Pi_u$ and the ground state $1s^2\ ^1\Sigma_g^+$ of the H_2 molecule (for simplicity, referred to as the C and the X states, respectively) is analyzed. At room temperature, only the lower vibrational level $v'' = 0$ of the ground state (see Fig. 1 of the enclosure) is populated. In the initial stage of the discharge, excitation of vibrational levels and C occurs as a result of collisions between electrons and molecules in their ground states. According to the Franck-Condon principle, due to shifting of the potential terms, the $v' = 1, 2, 3, 4$ states of the C level will be excited most effectively. The probab-

Card 1/3

L 36342-65

ACCESSION NR: AP5008759

ity of transitions from these levels to upper vibrational levels of the ground state will be relatively high, while the probability of transitions to the latter from the ground state $v'' = 0$ due to collisions with electrons will be very low. Thus, an inverted population should be attained between the $C(v' = 1-4)$ and $(v'' > 1)$ levels during the early stage of the discharge. When the pump power is sufficiently high, stimulated emission should occur on some bands in the spectral region between 1100 Å and 1250 Å due to the transitions shown in Fig. 1 by arrows. Owing to the symmetry of the H_2 molecule, radiative transitions between vibrational levels are forbidden. Also, the lifetime at the upper vibrational levels of the ground state is probably long. Therefore, continuous laser generation should be impossible. It is pointed out that the analysis also applies if the $2p\sigma^1\Sigma_u^+$ state rather than $2p\pi^1\Pi_u$ state is the upper electronic level. Orig. art. has: 1 figure. [CS]

ASSOCIATION: Fizicheskii institut im. P.N. Lebedeva Akademii nauk SSSR (Physics Institute, Academy of Sciences, SSSR)

SUBMITTED: 07Dec64

ENCL: 01

SUB CODE: EC, DP

NO REP SOV: 001

OTHER: 004

ATD PRESS: 3220

Cord 2/3

1. 36342-65

ACCESSION NR: AP5008759

ENCLOSURE: 01

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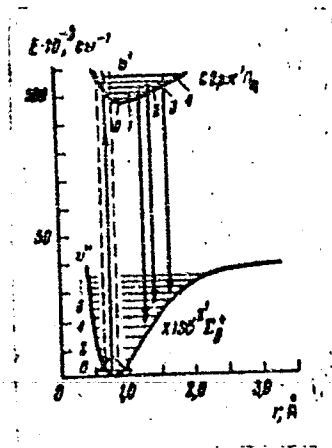


Fig. 1. Potential curves for the C and the X vibrational levels

Card 3/3

L 64700-65 EWT(1)/EWT(m)/EPT(c)/EWP(j)/T IJP(c) RM

ACCESSION NR: AR5012270

UR/0058/65/000/003/D044/D044

SOURCE: Ref. zh. Fizika, Abs. 3D336

AUTHOR: Bazhulin, P. A.; Rakov, A. V.; Rakhimov, A. A.

TITLE: Investigation of the "low" frequency Raman spectrum of crystalline para-dichlorobenzene at various temperatures

CITED SOURCE: Tr. Komis. po spektroskopii. AN SSSR, vyp. 1, 1964, 280-287

TOPIC TAGS: Raman spectrum, organic crystal, spectrographic analysis

TRANSLATION: The "low frequency" spectrum of crystalline para-dichlorobenzene is studied in the 920-1230K range. The basic parameters of the spectrum are measured: frequencies, line widths and intensity ratios of the lines in the spectrum. The results are discussed.

SUB CODE: OP

ENCL: 00

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BAZHULIN, P.A.; FNYAZEV, I.N.; PETRASH, G.G.

Pulse generation of a laser operating on molecular hydrogen.
Zhur. eksp. i teor. fiz. 47 no.4:1590-1591 0 '64.

(MIRA 18:1)

1. Fizicheskiy institut imeni P.N. Lebedeva AN SSSR.

BAZHULIN, P.A.; RAKHIMOV, A.A.

"Low frequency" Raman spectrum of crystalline stilbene and tolans
at various temperatures. Fiz. tver. tela 7 no.1:94-99 Ja '65.
(MIRA 18:3)

1. Fizicheskiy institut imeni Lebedeva AN SSSR, Moskva.

L 61885-65 EWA(k)/TFD/ENG(r)/ENT(1)/EEC(k)-2/T/EEC(b)-2/ENT(k)/EWA(m)-2/
ENT(k) P-1 P-2 P-3 P-4 P-5 P-6 P-7 P-8 P-9 P-10 P-11 P-12 P-13 P-14 P-15 P-16 P-17 P-18 P-19 P-20 P-21 P-22 P-23 P-24 P-25 P-26 P-27 P-28 P-29 P-30 P-31 P-32 P-33 P-34 P-35 P-36 P-37 P-38 P-39 P-40 P-41 P-42 P-43 P-44 P-45 P-46 P-47 P-48 P-49 P-50 P-51 P-52 P-53 P-54 P-55 P-56 P-57 P-58 P-59 P-60 P-61 P-62 P-63 P-64 P-65 P-66 P-67 P-68 P-69 P-70 P-71 P-72 P-73 P-74 P-75 P-76 P-77 P-78 P-79 P-80 P-81 P-82 P-83 P-84 P-85 P-86 P-87 P-88 P-89 P-90 P-91 P-92 P-93 P-94 P-95 P-96 P-97 P-98 P-99 P-100 P-101 P-102 P-103 P-104 P-105 P-106 P-107 P-108 P-109 P-110 P-111 P-112 P-113 P-114 P-115 P-116 P-117 P-118 P-119 P-120 P-121 P-122 P-123 P-124 P-125 P-126 P-127 P-128 P-129 P-130 P-131 P-132 P-133 P-134 P-135 P-136 P-137 P-138 P-139 P-140 P-141 P-142 P-143 P-144 P-145 P-146 P-147 P-148 P-149 P-150 P-151 P-152 P-153 P-154 P-155 P-156 P-157 P-158 P-159 P-160 P-161 P-162 P-163 P-164 P-165 P-166 P-167 P-168 P-169 P-170 P-171 P-172 P-173 P-174 P-175 P-176 P-177 P-178 P-179 P-180 P-181 P-182 P-183 P-184 P-185 P-186 P-187 P-188 P-189 P-190 P-191 P-192 P-193 P-194 P-195 P-196 P-197 P-198 P-199 P-200 P-201 P-202 P-203 P-204 P-205 P-206 P-207 P-208 P-209 P-210 P-211 P-212 P-213 P-214 P-215 P-216 P-217 P-218 P-219 P-220 P-221 P-222 P-223 P-224 P-225 P-226 P-227 P-228 P-229 P-230 P-231 P-232 P-233 P-234 P-235 P-236 P-237 P-238 P-239 P-240 P-241 P-242 P-243 P-244 P-245 P-246 P-247 P-248 P-249 P-250 P-251 P-252 P-253 P-254 P-255 P-256 P-257 P-258 P-259 P-260 P-261 P-262 P-263 P-264 P-265 P-266 P-267 P-268 P-269 P-270 P-271 P-272 P-273 P-274 P-275 P-276 P-277 P-278 P-279 P-280 P-281 P-282 P-283 P-284 P-285 P-286 P-287 P-288 P-289 P-290 P-291 P-292 P-293 P-294 P-295 P-296 P-297 P-298 P-299 P-300 P-301 P-302 P-303 P-304 P-305 P-306 P-307 P-308 P-309 P-310 P-311 P-312 P-313 P-314 P-315 P-316 P-317 P-318 P-319 P-320 P-321 P-322 P-323 P-324 P-325 P-326 P-327 P-328 P-329 P-330 P-331 P-332 P-333 P-334 P-335 P-336 P-337 P-338 P-339 P-340 P-341 P-342 P-343 P-344 P-345 P-346 P-347 P-348 P-349 P-350 P-351 P-352 P-353 P-354 P-355 P-356 P-357 P-358 P-359 P-360 P-361 P-362 P-363 P-364 P-365 P-366 P-367 P-368 P-369 P-370 P-371 P-372 P-373 P-374 P-375 P-376 P-377 P-378 P-379 P-380 P-381 P-382 P-383 P-384 P-385 P-386 P-387 P-388 P-389 P-390 P-391 P-392 P-393 P-394 P-395 P-396 P-397 P-398 P-399 P-400 P-401 P-402 P-403 P-404 P-405 P-406 P-407 P-408 P-409 P-410 P-411 P-412 P-413 P-414 P-415 P-416 P-417 P-418 P-419 P-420 P-421 P-422 P-423 P-424 P-425 P-426 P-427 P-428 P-429 P-430 P-431 P-432 P-433 P-434 P-435 P-436 P-437 P-438 P-439 P-440 P-441 P-442 P-443 P-444 P-445 P-446 P-447 P-448 P-449 P-450 P-451 P-452 P-453 P-454 P-455 P-456 P-457 P-458 P-459 P-460 P-461 P-462 P-463 P-464 P-465 P-466 P-467 P-468 P-469 P-470 P-471 P-472 P-473 P-474 P-475 P-476 P-477 P-478 P-479 P-480 P-481 P-482 P-483 P-484 P-485 P-486 P-487 P-488 P-489 P-490 P-491 P-492 P-493 P-494 P-495 P-496 P-497 P-498 P-499 P-500 P-501 P-502 P-503 P-504 P-505 P-506 P-507 P-508 P-509 P-510 P-511 P-512 P-513 P-514 P-515 P-516 P-517 P-518 P-519 P-520 P-521 P-522 P-523 P-524 P-525 P-526 P-527 P-528 P-529 P-530 P-531 P-532 P-533 P-534 P-535 P-536 P-537 P-538 P-539 P-540 P-541 P-542 P-543 P-544 P-545 P-546 P-547 P-548 P-549 P-550 P-551 P-552 P-553 P-554 P-555 P-556 P-557 P-558 P-559 P-560 P-561 P-562 P-563 P-564 P-565 P-566 P-567 P-568 P-569 P-570 P-571 P-572 P-573 P-574 P-575 P-576 P-577 P-578 P-579 P-580 P-581 P-582 P-583 P-584 P-585 P-586 P-587 P-588 P-589 P-590 P-591 P-592 P-593 P-594 P-595 P-596 P-597 P-598 P-599 P-600 P-601 P-602 P-603 P-604 P-605 P-606 P-607 P-608 P-609 P-610 P-611 P-612 P-613 P-614 P-615 P-616 P-617 P-618 P-619 P-620 P-621 P-622 P-623 P-624 P-625 P-626 P-627 P-628 P-629 P-630 P-631 P-632 P-633 P-634 P-635 P-636 P-637 P-638 P-639 P-640 P-641 P-642 P-643 P-644 P-645 P-646 P-647 P-648 P-649 P-650 P-651 P-652 P-653 P-654 P-655 P-656 P-657 P-658 P-659 P-660 P-661 P-662 P-663 P-664 P-665 P-666 P-667 P-668 P-669 P-670 P-671 P-672 P-673 P-674 P-675 P-676 P-677 P-678 P-679 P-680 P-681 P-682 P-683 P-684 P-685 P-686 P-687 P-688 P-689 P-690 P-691 P-692 P-693 P-694 P-695 P-696 P-697 P-698 P-699 P-700 P-701 P-702 P-703 P-704 P-705 P-706 P-707 P-708 P-709 P-710 P-711 P-712 P-713 P-714 P-715 P-716 P-717 P-718 P-719 P-720 P-721 P-722 P-723 P-724 P-725 P-726 P-727 P-728 P-729 P-730 P-731 P-732 P-733 P-734 P-735 P-736 P-737 P-738 P-739 P-740 P-741 P-742 P-743 P-744 P-745 P-746 P-747 P-748 P-749 P-750 P-751 P-752 P-753 P-754 P-755 P-756 P-757 P-758 P-759 P-760 P-761 P-762 P-763 P-764 P-765 P-766 P-767 P-768 P-769 P-770 P-771 P-772 P-773 P-774 P-775 P-776 P-777 P-778 P-779 P-780 P-781 P-782 P-783 P-784 P-785 P-786 P-787 P-788 P-789 P-790 P-791 P-792 P-793 P-794 P-795 P-796 P-797 P-798 P-799 P-800 P-801 P-802 P-803 P-804 P-805 P-806 P-807 P-808 P-809 P-810 P-811 P-812 P-813 P-814 P-815 P-816 P-817 P-818 P-819 P-820 P-821 P-822 P-823 P-824 P-825 P-826 P-827 P-828 P-829 P-830 P-

ACTH 2 Buzdalov, A. A. Ryazov, I. N., Petrush, I. I.

TITLE Stimulated emission of hydrogen and deuterium molecules in the near-infrared spectral region

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 49, no. 1, 1965, 16-23

TOPIC TAGS: stimulated emission, laser, population inversion, gas laser 25, 44

ABSTRACT: Laser action was attained for the first time in D₂ and HD gases by means of a high-voltage excitation. The wavelengths of the emission lines from H₂ determined earlier by the authors (ZhETF, v. 47, no. 4(10), 1964, 1590) and redetermined with a greater degree of accuracy in the present experiments, and those of D₂ and HD observed for the first time are listed in a table together with the band and the transition data. The first three lines for H₂ and the two lines for D₂ in the table were measured with an accuracy greater than 0.08 Å. Comparison of the experimental results with those of G. H. Dicke (column 3 of the table) shows that for these five lines the discrepancy between the two sets of data does not exceed 0.06 Å. However, for the remaining three lines of H₂ marked by an asterisk the wavelengths were meas-

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ACCESSION NR: AP5019210

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ured with an accuracy of about 10 \AA , which is insufficient for positive identification of the transitions tentatively assigned to these lines in column 4 of the table. A weak oscillation line, observed in a mixture of equal parts of hydrogen and deuterium (46% HD, 27% H₂, and 27% D), measured with an accuracy of about 10 \AA , falls within the $1 \rightarrow 0$ band of the electronic transition $E \rightarrow B$ of the HD molecule. A mechanism responsible for populating the vibrational levels in H₂, D₂, and HD molecules involved in the laser action is discussed in detail in terms of the Franck-Condon principle. A comparison of the theoretical results with the experimental data confirms the mechanism suggested for population inversion in the H₂, D₂, and HD molecules. [CS]
Orig. art. has: 4 figures and 1 table.

ASSOCIATION: Fizicheskii institut im. P. N. Lebedeva Akademii nauk SSSR
(Physics Institute, Academy of Sciences, SSSR) 44

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SUB CODE: EC

NO REF SOV: 003

OTHER: 011

AND PRESS: 460

Card

2/2

L 6987-66 EPP(e)/EWP(j)/EWA(e)/EWT(m) RM/ JIT(cs)

ACC NR: AP5020241

SOURCE CODE: UR/0188/65/000/004/0066/0072

AUTHOR: Bazhulin, P. A.; Chekunov, A. V.

ORG: Department of Optics (Kafedra optiki)

TITLE: Investigation of the dependence on the concentration of the intensity of the infra-red band absorption of pyridine in solution

SOURCE: Moscow. Universitet. Vestnik. Seriya 3. Fizika, astronomiya, no. 4, 1965, 66-72

TOPIC TAGS: pyridine, absorption band, infra-red absorption, hydrogen bonding

ABSTRACT: Studies were made on the absorption in the infra-red band of pyridine¹ in several solutions. The most important solvents were those containing the OH group (ethyl alcohol chiefly). Other solvents were carbon disulfide, chloroform, bromoform, acetone and carbontetrachloride, which do not contain the OH group. In solvents not containing the OH group little change is noted in the spectra. When ethyl alcohol is used as a solvent, however, a new band absorption is noted corresponding to the complexing of pyridine with ethyl alcohol molecules. This is due to the

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hydrogen bond formed between the two molecules. A new line appears at $\nu = 1000$ which is absent in pure pyridine and in neutral solvents. Two lines at 1000 \AA and 991 \AA vary in intensity with pyridine concentration but their position does not. When deuterium oxide is used there is some frequency displacement. Two other lines appear due to complexing when iodine is the solvent. The intensity, displacement and half width of infra-red bands as functions of the concentration and characteristics of the solvents were investigated since intensity data is lacking elsewhere. The concentration dependence of the index of absorption (K_{ν}) and the half width ($\Delta\nu_0$) of certain lines corresponding to frequencies of vibration of functional groups in pyridine was noted. Solutions were examined in a cuvette and corrections made for its thickness. The index of absorption was found proportional to the optical density, concentration, and thickness of the cuvette. A chart gives the intensities of certain wavelengths in solution of carbontetrachloride, chloroform, acetone, and bromoform as a function of concentration. The spectra is also shown for pure pyridine and in ethyl alcohol solution in a small range. Internal energy and temperature functions are used throughout and the index of absorption is related to the concentrations of the pure material and the complexes. The log of the index of absorption varies linearly with the reciprocal of the temperature. Orig. art. has: 9 formulas, 4 figures and 1 table.

SUB CODE: OP,GC/ SUBM DATE: 29Apr64/ ORIG REF: 005/ OTH REF: 007
Card 2/2

L 6451-66 EWT(1)/T/EED(b)-3 IJP(c)
 ACCESSION NR: AP5019858

UR/0181/65/007/008/2413/2416

AUTHOR: Aref'yev, I. M.; ^{44, 55}Bazhulin, P. A.; ^{44, 55}Mikhal'tseva, T. V. ^{44, 55}

TITLE: Long wave infrared transmission spectra of KH_2PO_4

SOURCE: Fizika tverdogo tela, v. 7, no. 8, 1965, 2413-2416

TOPIC TAGS: potassium compound, phosphorus containing compound, transmission spectrum, IR spectrum, optic transmission, temperature dependence, diffraction grating, absorption band, dielectric constant, Curie point, ferroelectric property

ABSTRACT: This is a continuation of earlier work (FTT v. 7, 407, 1965) on the temperature dependence of the low-frequency Raman spectra of KH_2PO_4 and $\text{NH}_4\text{H}_2\text{PO}_4$. The present study was undertaken to refine the results in the excitation-wavelength region, where the results were distorted by ghosts due to the diffraction gratings. The authors determined the transmission spectra of a polycrystalline sample constituting a suspension of the powdered KH_2PO_4 crystal in paraffin in the frequency range 20--235 cm^{-1} at room temperature. The entire band was covered with two echelettes and 4 and 2 lines/mm, and in the 160--235 section of the spectrum the 4 lines/mm echelette was used in second order. The results are plotted in Fig. 1 of the Enclosure and confirm the previously observed broad absorption band at ~ 52

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